

CLAIMS

1. A system for therapy and diagnosis of a human or animal comprising at least one first radiation source for emission of radiation, and at least one first radiation conductor adapted to conduct radiation to a tumor site at or in said human or animal, wherein the radiation conductor is in use employed as a transmitter and/or a receiver for conduction of radiation to and/or from the tumour site for therapy and diagnosis of a tumour at the tumour site, characterised by at least one distributor adapted to distribute said radiation from at least the first radiation source to the tumour site, wherein the distributor comprises at least one longitudinal translatable element being arranged in such a manner that radiation is coupled in different constellations for different operating modes of said system by longitudinal translatable movement of said longitudinal translatable element between pre-determined positions, wherein said radiation is non-ionising electromagnetic radiation.

2. The system according to claim 1, wherein said first radiation is diagnostic radiation, and the system comprising at least one second radiation source for emission of a therapeutic radiation through at least one of said radiation conductors to said site.

3. The system according to claim 1 or 2, said tumour therapy and diagnosis being interactive interstitial photodynamic tumour therapy and/or photothermal tumour therapy and/or tumour diagnosis.

4. The system according to any of the preceding claims, characterised by

5 a plurality of first radiation conductors
arranged for conducting radiation to and from the tumour site,

a plurality of second radiation conductors
arranged for delivering radiation from at least one
radiation source and/or conduction of radiation to at least
10 one radiation sensor, and

wherein said distributor is a distributor for
distribution of radiation from at least one radiation
source to the tumour site and/or from the tumour site to at
least one radiation sensor, wherein the distributor
15 comprises at least two translatable elements being arranged
in such a manner that radiation is coupled in different
constellations by translatable movement of a first of said
element between pre-determined positions relative to a
second of said members.

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5. The system according to claim 4, characterised
in that each element has holes arranged for receiving said
radiation conductors and that corresponding holes on the
two elements are equidistantly arranged on a straight line.

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6. The system according to claim 5, characterised
in that first ends of the first radiation conductors are
fixed in the holes of a translatable displacement element
and first ends of second radiation conductors are fixed in
30 the holes in the other element, wherein the first and the
second radiation conductors are connectable to each other

in different constellations through said longitudinal translatory movement between pre-determined positions of the longitudinal translatory displacement element and the other element relative each other.

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7. The system according to claim 6, **characterised** in that said other element is a second longitudinal translatory displacement element.

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8. The system according to claim 1 or 5, **characterised** by further comprising two flat discs in close proximity to each other, wherein said discs are turnable relatively to each other,

each disc having holes arranged on a circular
15 line, wherein the circle radius on one disc equals the circle radius on the other disc and where the holes in one disc are equally distributed on the circle line with an angular separation of $v_1 = (360/n_1)$ degrees, n_1 being the number of holes, and the holes in the other disc are
20 equally distributed on the circle line with an angular separation of $v_2 = (360/n_2)$ degrees, wherein $n_2 = m \times n_1$, and wherein m is a multiple, which yields n_2 as an integer ≥ 1 , and

wherein first ends of said third radiation
25 conductors are fixed in the holes of the first disc and first ends of fourth radiation conductors are fixed in all holes of the second disc except for one, whereby the third and the fourth radiation conductors by rotation of the turnable disc relative to each other are connectable to
30 each other in different constellations,

and wherein said longitudinal translatable element is arranged substantially radially outwards movable and integrated with said other disc to couple between a plurality of said first radiation conductors to one of said
5 third radiation conductors.

9. The system according to claim 8, characterised by n_1 being the number of holes in the first disc of the distributor, $n_1 = 6$ and $m = 2$, yielding $n_2 = 12$ holes in
10 the second disc of the distributor.

10. The system according to claim 8 or 9, characterised by every other fourth radiation conductor being part of a first series of fourth radiation conductors and that an radiation conductor in said first series of
15 fourth radiation conductors being arranged for emitting radiation from the radiation source and the other radiation conductors in said first series of fourth radiation conductors being arranged for conduction of radiation to
20 the radiation sensor.

11. The system according to any of claims 8 to 9, characterised in said first radiation conductors being connected to diagnostic radiation sources, such that the
25 longitudinal translatable element in said other disc couples one of said diagnostic radiation sources to one of said third radiation conductors in said first disc.

12. The system according to any of claims 1 to
30 11, characterised by the diagnostic radiation source being

a light source for near-infrared (NIR), white, red, blue/violet and/or ultraviolet light.

13. The system according to any of claims 1 to
5 12, characterised by the diagnostic radiation source comprising a beamsplitter.

14. The system according to claim 13,
characterised by a transferring radiation conductor being
10 arranged between a dichroic beamsplitter and the radiation sensor.

15. The system according to claim 12,
characterised by the third radiation conductors second ends
15 being treated by a material with temperature sensitive fluorescence emission.

16. The system according to claims 8 or 9,
characterised by every second of said fourth radiation
20 conductors being part of a second series of fourth radiation conductors arranged for emission of radiation from the radiation source.

17. The system according to claims 2 to 16,
25 characterised by the therapeutic radiation source being a light source for coherent light of a single fixed wavelength.

18. A system according to any of claims 1 to 17,
30 characterised by the distributor including means for

locking the radiation distributor into pre-determined transversal and/or azimuthal positions.

19. A system according to any of the preceding
5 claims, characterised by the radiation conductors being optical fibres.

20. The system according to claims 12 to 14,
characterised by fluorescence being recorded through the
10 same radiation conductor as the one transmitting radiation to the tumour site.

21. The system according to claim 15,
characterised in that for interactive photodynamic therapy
15 one or several of the radiation conductors which are treated with the material with a temperature sensitive fluorescence emission are in use measuring the temperature at the tumour site,

that the radiation which is sent to the tumour
20 site in use heats the tumour site, and

that the intensity of the radiation is
controllable by the measured temperature in order to
regulate the temperature of the tumour site at the
individual radiation conductors.

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22. The system according to any of the preceding
claims, characterised in that said longitudinal translatory
displacement element is an optical sledge.

23. The system according to any of the preceding
30 claims, characterised by at least one stepping motor or at

least one servo system for moving said elements of said radiation distributor relative each other.

24. The system according to any of the preceding
5 claims, **characterised** in that said operation modes are modes of the system comprised in the list of: interactive interstitial photodynamic tumour therapy, photothermal tumour therapy using hyperthermia, and tumour diagnostics, whereby these operation modes in use are alternated during
10 the same occasion of treatment of said tumour site.

25. The system according to any of claims 2 to 24, **characterised** by said operation modes of said system comprising

15 a diagnostic operation mode, wherein one diagnostic radiation source is coupled via a first longitudinal translatory element to said first radiation conductors transmitting diagnostic light to said site and the remaining first radiation conductors are coupled to a
20 radiation detector, and

a therapeutic operation mode, wherein said therapeutic radiation sources are coupled to said first radiation conductors transmitting therapeutic radiation to said site.

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26. The system according to claim 25, **characterised** in that at least one second longitudinal translatory element switches between the operating modes.

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27. The system according to claim 26, **characterised** in that a third longitudinal translatory

element is configured to switch between a plurality of radiation conductors from said second longitudinal translatory element to said radiation detector.

5 28. A method for interactive interstitial photodynamic tumour therapy and/or photothermal tumour therapy and/or tumour diagnosis, wherein at least one radiation sensor and radiation conductor is connected to a tumour site and the radiation conductor is used as a transmitter
10 and/or a receiver for conduction of radiation to and/or from a tumour site for diagnosis and therapy of a tumour at the tumour site,

 characterised in that the switching between tumour therapy and tumour diagnostics is achieved in an
15 automatised way by switching radiation conductors between different constellations by means of a radiation distributor comprised in the system according to any of claims 1 to 27, and

 that the results from the diagnostics control the
20 therapy process by regulating a therapeutical radiation intensity depending on the results of the diagnostics until an optimal treatment of the tumour site is achieved.

 29. The method according to claim 28,
25 characterised by alternately utilising interactive interstitial photodynamic tumour therapy, photothermal tumour therapy using hyperthermia, and tumour diagnostics during the same occasion of treatment of said tumour site.